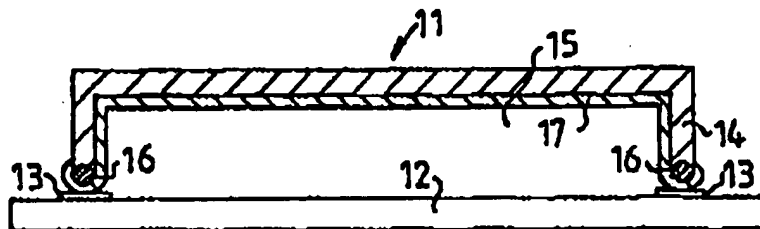


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(54) Title: A SHIELDING HOUSING AND A METHOD OF PRODUCING A SHIELDING HOUSING



(57) Abstract

A shielding housing (11) for electrically shielding at least one component on a printed circuit board (12), comprises a layer (14) of a non-shielding material having at least one cavity (15) for receiving said at least one component. An elastic gasket (16) is provided on the rim of said at least one cavity (15). A layer (17) of an electrically shielding material covers the gasket (16) as well as one or both surfaces of said layer (14) of a non-shielding material. In operation, the shielding housing (11) is pressed with its gasket (16) against a conductor (13) located on the printed circuit board (12) around said at least one component to be shielded.

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WO 98/47340

PCT/SE98/00654

A SHIELDING HOUSING AND A METHOD OF PRODUCING A SHIELDING HOUSING

TECHNICAL FIELD

5 The invention relates to a shielding housing for electrically shielding one or more components on a printed circuit board as well as to a method of producing such a shielding housing.

BACKGROUND OF THE INVENTION

10 To prevent components in electronic equipment, e.g. mobile phones, from transmitting unwanted high-frequency signals that may interfere with other electronic equipment or vice versa, i.e. to prevent other electronic equipment from interfering with components in mobile phones, such components have to be electrically shielded. Moreover, such a shielding is necessary in order for the
15 equipment to comply with electromagnetic compatibility (EMC) requirements.

Today, soldered shielding cans or housings are used to shield critical components on a printed circuit board. The shielding cans are soldered to conductors on the printed circuit board to cover the critical components.

20

However, it is often necessary to test the components located under the shielding cans. Such tests have to be carried out both during production stages and at after-sales services.

25 Shielding cans soldered to printed circuit boards are difficult to remove and replace in connection with such tests and services.

SUMMARY OF THE INVENTION

30 The object of the invention is to bring about a shielding housing which is easy to mount and dismount, and which is inexpensive to produce and inexpensive to replace.

This is attained in that the shielding housing in accordance with the invention, is made of an inexpensive non-shielding material or semi-shielding/semi-conducting material, e.g. a plastic material, with or without conductive fillers such as graphite and metal fibers, and has at least one cavity for receiving the components to be shielded. Along the rim of the cavity, an elastic gasket is provided. The gasket as well as the inner and/or outer surface of the housing is covered by an electrically shielding material, e.g. a conductive paint, a metallization or a metal foil. The shielding housing according to the invention is intended to be pressed, i.e. not soldered, with its gasket against a conductor which is provided around the components to be shielded.

Hereby, the shielding housing will be easy to mount and dismount. Since the shielding housing according to the invention is made of inexpensive material, it is inexpensive to produce.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described more in detail below with reference to the appended drawing, on which Figs. 1 - 5 are schematical cross-sectional views of five different embodiments of a shielding housing according to the invention.

PREFERRED EMBODIMENTS

It should be pointed out that, in order to better illustrate the invention, the dimensions of layers and other elements of the different embodiments shown in Figs. 1 - 5, are greatly exaggerated.

On the drawing, Fig. 1 shows a first embodiment of a shielding housing in accordance with the invention, generally denoted 11, for shielding one or more components (not shown) on a printed circuit board 12. On the printed circuit board, in a manner known per se, a conductor 13 surrounds the components to be shielded by means of the shielding housing 11.

The housing 11 as shown on the drawing, comprises a layer 14 of an inexpensive, non-shielding material, e.g. a plastic material, which is somewhat rigid. In the embodiment according to Fig. 1, the layer 14 is formed to define a single cavity 15 for receiving the components (not shown) to be shielded on the board 12.

Along the rim of the housing 11, i.e. along the rim of the cavity 15 in the embodiment shown, an elastic gasket 16 has been deposited. The gasket 16 may be made of any suitable non-conductive, semi-shielding/semi-conductive or conductive elastic material, e.g. a plastic material such as silicone, silicone rubber, epoxy, polyurethane or thermoplastic elastomers.

The gasket 16 may be deposited on the rim of the cavity 15 e.g. by injection moulding, gluing, dispensation or any other suitable process.

In accordance with the invention, in the embodiment shown, the gasket 16 and the inner surface of the layer 14, i.e. the inside of the cavity 15, are covered by a layer 17 of an electrically shielding material, e.g. a conductive paint, a metallization or a metal foil.

Instead of being soldered to the conductor 13 on the printed circuit board 12, in accordance with the invention, the housing 11 is supposed to be pressed with its gasket 16 against the conductor 13 by means of e.g. at least one screw (not shown) or at least one clip (not shown). In case of a mobile phone, the housing 11 may be pressed against the printed circuit board by means of e.g. a covering lid (not shown) of the mobile phone.

Fig. 2 shows a second embodiment of a shielding housing 21 according to the invention. As in the embodiment in Fig. 1, the housing 21 according to Fig. 2 comprises a layer 24 of an inexpensive, non-shielding material, which is formed to define a single cavity 25 for receiving the components (not shown) to be shielded on

the printed circuit board (not shown in Fig. 2). Along the rim of the housing 21, i.e. along the rim of the cavity 25 in the embodiment shown, an elastic gasket 26 has been deposited. The embodiment according to Fig. 2 differs from the embodiment according to Fig. 1 merely in that the gasket 26 and the outer surface of the layer 24, i.e. the outside of the cavity 25 instead of its inside, are covered by a layer 27 of an electrically shielding material of the same type as in Fig. 1.

It is to be understood that, from a production point of view, it may be convenient, in a manner not illustrated, to cover both the inside and the outside of a housing in accordance with Figs. 1 and 2, as well as the gasket with a layer of an electrically shielding material.

Fig. 3 illustrates a third embodiment of a shielding housing 31 according to the invention. The shielding housing 31 resembles the shielding housing 11 in Fig. 1 but is provided with two cavities 35 for shielding two different sets of components (not shown) on a printed circuit board 32. The cavities 35 are separated by an elastic partition wall 38 formed from the same material and in the same process as gaskets 36 along the outer rim of the housing 31, i.e. along the rim of a layer 34 of an inexpensive, non-shielding material. In the embodiment according to Fig. 3, a layer 37 of a shielding material is deposited on the gasket 36, on the inside of the housing 31, and on the sides and the lower rim of the partition wall 38. As a consequence, the printed circuit board 32 has to be provided with conductors 33 cooperating with not just the gasket 36 but also with the lower rim of the partition wall 38.

Fig. 4 illustrates a fourth embodiment of a shielding housing 41 according to the invention. The embodiment in Fig. 4 resembles the embodiment in Fig. 2, but in accordance with the invention, the housing 41 is provided with a guiding pin 48 which is adapted to cooperate with a corresponding hole 49 in a printed circuit board 42 to fix the location of the housing 41 on the board 42. The guiding pin 48 is made integral with the layer 44 of a non-shielding material in the embodiment

illustrated in Fig. 4. As in the embodiment in Fig. 2, a layer 47 of a shielding material is deposited on the gasket 46 and the outside of the housing 41.

Fig. 5 is a fifth embodiment of a shielding housing 51 according to the invention.

5 The embodiment in Fig. 5 resembles the embodiment in Fig. 4. The only difference between these embodiments is that a layer 57 of shielding material covers a gasket 56 at the rim of the housing 51 as well as both the inside and the outside of the housing 51 and all of a guiding pin 58 cooperating with a corresponding hole 59 in a printed circuit board 52. As in the other embodiments, the housing 51 is supposed to
10 be pressed with its gasket 56 against a conductor 53 on the printed circuit board 52.

Thus, since the shielding housing according to the invention is not intended to be soldered to a printed circuit board, it will be easy to remove in order to test the components that are located thereunder. After such a test, it will be equally easy to
15 put the shielding housing back in place.

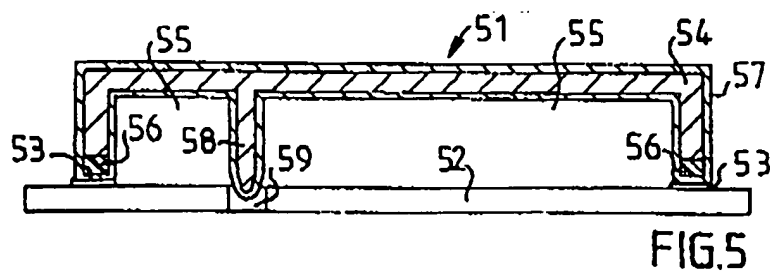
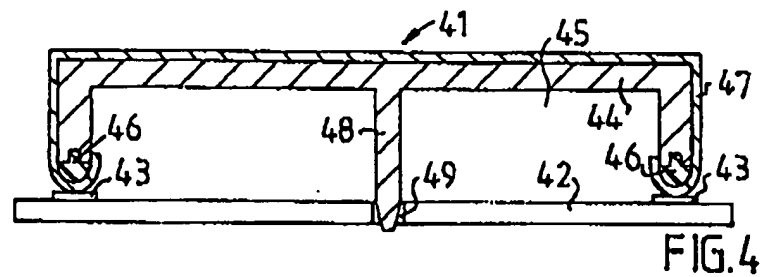
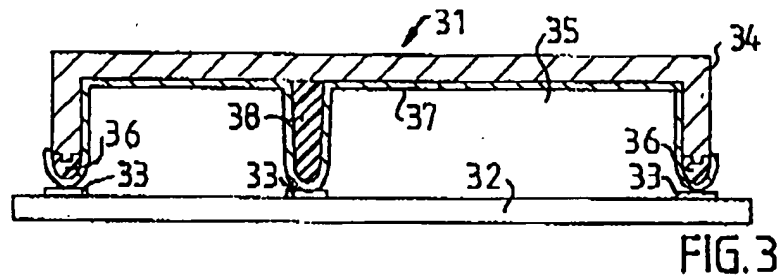
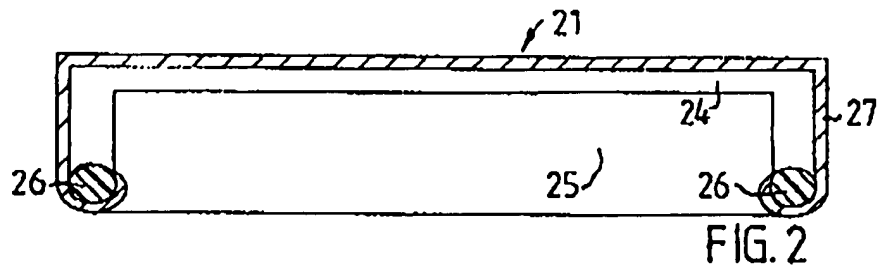
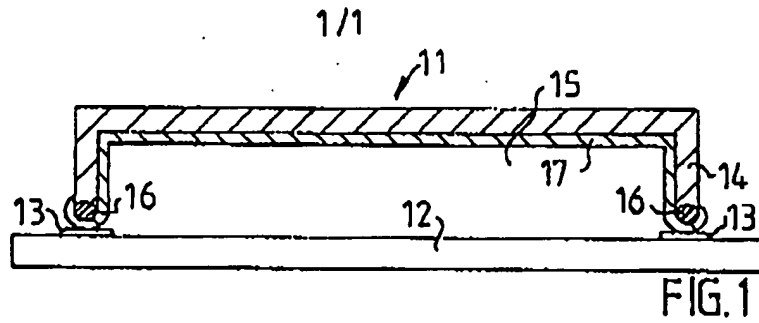
By using inexpensive material, the shielding housing according to the invention will also be inexpensive to produce. Should the shielding housing have to be replaced, such a replacement will consequently not involve any high costs.

CLAIMS

1. A shielding housing (11) for electrically shielding at least one component on a printed circuit board (12), characterized in that the housing (11) comprises a layer (14) of a non-shielding material having at least one cavity (15) for receiving said at least one component, that an elastic gasket (16) is provided on the rim of said at least one cavity (15), and that a layer (17) of an electrically shielding material covers the gasket (16) as well as one or both surfaces of said layer (14) of a non-shielding material, the shielding housing (11) being intended to be pressed with its gasket (16), covered by said layer (17) of an electrically shielding material, against a conductor (13) located on the printed circuit board (12), around said at least one component to be shielded.
2. The housing as claimed in claim 1, characterized in that it is provided with at least one guiding pin (48) which is adapted to cooperate with a corresponding hole (49) in the printed circuit board (42) to fix the location of the shielding housing (41) on the printed circuit board (42).
3. The housing as claimed in claim 2, characterized in that said at least one guiding pin (48) is formed integral with said layer (44) of a non-shielding material.
4. The housing as claimed in any of claims 1 - 3, characterized in that at least one screw or clip is provided to press the shielding housing with its gasket against said conductor on the printed circuit board.
5. The housing as claimed in any of claims 1 - 4, characterized in that the material of the elastic gasket (16) is selected from a group comprising non-conductive, semi-shielding/semi-conducting and conductive materials.
6. A method of producing a shielding housing (11) for electrically shielding at least one component on a printed circuit board (12), characterized by forming at least

one cavity (15) in a layer (14) of a non-shielding material for receiving said at least one component, depositing a gasket (16) of an elastic material on the rim of said at least one cavity (15), and depositing a layer (17) of an electrically shielding material on the gasket (16) as well as on one or both surfaces of said layer (14) of a non-shielding material, the shielding housing (11) being intended to be pressed with its gasket (16), covered by said layer (17) of an electrically shielding material, against a conductor (13) on the printed circuit board (12), surrounding said at least one component to be shielded.

10 7. A mobile phone comprising, on a printed circuit board, at least one component to be electrically shielded by a shielding housing cooperating with a conductor on the printed circuit board, characterized in that the shielding housing comprises a layer of a non-shielding material having at least one cavity for receiving said at least one component, that an elastic gasket is provided on the rim of said at least one cavity, and that a layer of an electrically shielding material covers the gasket as well as one or both surfaces of said layer of a non-shielding material, the shielding housing being pressed with its gasket, covered by said layer of an electrically shielding material, against the conductor on the printed circuit board.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/00654

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H05K 9/00, G12B 17/02

According to International Patent Classification (IPC) or to both national classification and IPC:

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H05K, G12B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, CLAIMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5150282 A (MASASHI TOMURA ET AL), 22 Sept 1992 (22.09.92), column 3, line 20 - column 4, line 10, abstract --	1,6,7
A	Patent Abstracts of Japan, Vol 95, No 12 abstract of JP 7-326880 A (JAPAN RADIO CO LTD), 12 December 1995 (12.12.95), see the whole document --	1,6,7
A	Patent Abstracts of Japan, Vol 96, No 4 abstract of JP 8-107286 A (YUPITERU IND CO LTD), 23 April 1996 (23.04.96), see the whole document --	1,6,7

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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A	Patent Abstracts of Japan, Vol 96, No 11 abstract of JP 8-316677 A (SONY CORP), 29 November 1996 (29.11.96), see the whole document --	1,6,7
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US 5150282 A	22/09/92	NONE	
US 5235492 A	10/08/93	US 5124889 A	23/06/92